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PROSTATE GLAND DISORDERS AND OVERACTIVE BLADDER
[Zenritsusen Shikkan to Kakatsudō Bōkō]

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Prostate Gland Disorders and Overactive Bladder

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Key Words:

hypertrophy of prostate gland

overactive bladder

urination urge

frequent urination (pollakiuria)

urine incontinence

Points

- Overactive bladder is a pathological condition defined by its symptoms. The main symptom is the urge to urinate accompanied by frequent urination and nocturnal incontinence.
- Many of the causes of overactive bladder are unknown; however, lower urinary tract occlusion accompanying hypertrophy of the prostate gland is the cause.
- Hypertrophy of the prostate gland is not an elimination disorder or an accumulated urine disorder (overactive bladder).

* Numbers in the margin indicate pagination in the foreign text.

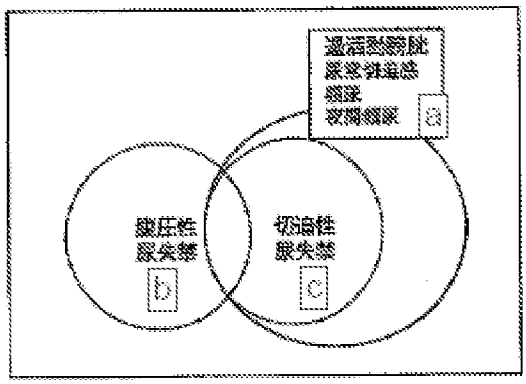

Figure 1 Urine Incontinence and Overactive Bladder
Key: a) overactive bladder
urge to urinate
frequent urination
nocturnal incontinence
b) abdominal pressure urine incontinence
c) urge urine incontinence

Foreword

In addition to disorders of elimination of urine as clinical symptoms related to urination caused by prostate gland diseases, there are also symptoms such as accumulated urine disorders, that is, the urge to urinate, frequent urination (pollakiuria), incontinence and the like and it is a significant cause wherein the quality of life is adversely affected.

In this study, we are describing the concept of overactive bladder and prostate gland illnesses (in particular, hypertrophy of the prostate gland).

Overactive Bladder

A new concept of a disease known as overactive bladder is defined by its symptoms[1)]. Whether or not there is incontinence caused by the

urge to urinate, these symptoms constitute an urge to urinate accompanied by frequent urination and frequent nocturnal urination (Figure 1). These symptoms suggest detrusor overactivity confirmed by urination flow condition tests; however, urination flow condition tests are not required in the diagnosis of overactive bladder. Furthermore, this term is used for infections, cancer, calculus, polyuria and the like and the urge to urinate sometimes cannot be explained. Factors which cause overactive bladder are lower urethra occlusion • cerebrovascular disorders • spinal cord injuries and other nerve impairments, advanced age, chronic cystitis, chronic cystalgia and other types of so-called bladder hypersensitivity /1150 and the like. However, most of the cases of overactive bladder are idiopathic and their cause cannot be specified. Now that this new type of disease concept has been proposed, symptoms of overactive bladder are quite frequently seen in the elderly so that they are not restricted to medical specialists and more and more physicians are thought to consider that more and more patients must be treated.

Table 1 International Incontinence Scores (provisional title)

1. What is the extent of urination in frequent urination?
(check one of the boxes)

☐ none	0 points
☐ about once a week or less	1 point
☐ 2 or 3 times a week	2 points
☐ about once a day	3 points
☐ several times a day	4 points
☐ always	5 points

2. How much urine is passed?

☐ none	0 points
☐ a small amount	2 points
☐ medium amount	4 points
☐ large amount	6 points

3. What is the extent of discomfort caused by urination in your daily life?

0 1 2 3 4 5 6 7 8 9 10

←----------→

none whatsoever very much

4. When do you urinate?
(please check the appropriate box)

☐ no urine
☐ before I get to the toilet
☐ when I cough and sneeze
☐ when I am sleeping
☐ when I move around and exercise
☐ after I urinate when I get dressed
☐ don't know the reason why
☐ always

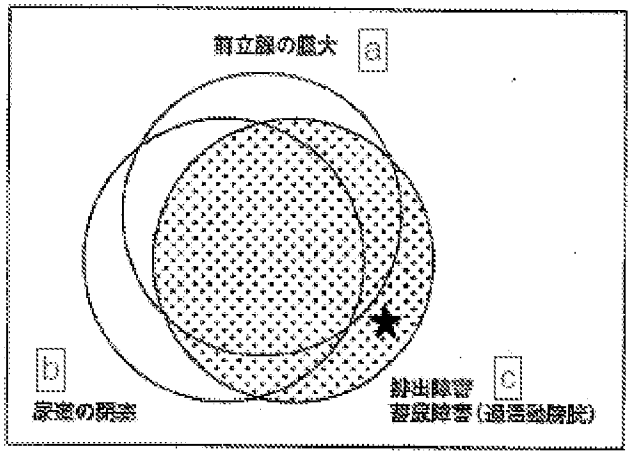

Figure 2 Hypertrophy of the Prostate Gland and Overactive Bladder
Key:
a) hypertrophy of the prostate gland
b) occlusion of urinary tract
c) elimination disorder; accumulated urine disorder (overactive bladder)

Although urine flow condition tests are not required in the diagnosis of overactive bladder, it would be difficult to say that these are totally unnecessary tests. Realistically, treatment of overactive bladder is often started without carrying out any urine flow condition tests in urological practices taking into consideration the symptoms, physical findings, urine findings and the like. Urine flow condition tests are carried out to diagnose overactivity of the sphincter by reproducing the urination cycle within a short period of time. In most cases, the findings in the urine flow condition test findings coincide with the clinical /1151 symptoms. However, it is impossible to determine if there are abnormalities since the sphincter overactivity was not proven. The

reverse also holds true. Although urine flow condition tests are not required for diagnosis of overactive bladder, realistically it is thought that carrying out urine flow condition tests (introduction by general practitioner to a specialist) positions the test as a thorough examination when the patient is not satisfied even when a diagnosis of overactive bladder is made based on the symptoms in the course of general clinical practice for approximately 1 to 3 months[2].[2].

Overactive bladder is the concept of an illness the chief symptom of which is the urge to urinate. However, even this urge to urinate must be defined. Just so that there are no errors in the nuance of words, the original text reads "urgency is the complaint of a sudden compelling desire to pass urine, which is difficult to defer"[1]. However, the gravity of the illness as well as the frequency must be defined through practice. In other words, "shouldn't you stop what you're doing now and go to the bathroom," "it takes one to two minutes to reach the bathroom, can't you wait?," "can you go once a day? Or once a week or once a month?" and the like[2]). Scored tests relating to the gravity of the illness have already been carried out for these at the International Urination Incontinence Conference in 2001 and results are indicated in Table 1[3]. The fourth section in the test has been included for reference for diagnosis.

Hypertrophy of the Prostate Gland and Bladder Overactivity

In many cases, hypertophy of the prostate gland and occlusion of the urinary tract as well as urination disorders (elimination disorders, accumulated urine disorders) are related; however, they by no means coincide with one another (Figure 2). I have clinical experience in treatment of cases where there was no occlusion of the urinary tract even if there was hypertrophy of the prostate gland and no urination disorder as well as cases in which a urination disorder was confirmed even if there was no hypertrophy of the prostate gland. Furthermore, even if the term hypertrophy disease of the prostate gland is used, the definition of the word is such that there are theories that this is a diagnosis of pathology, a diagnosis based on urine flow condition tests, a diagnosis made on the basis of symptoms and the like and it is by no means clear[4]. However, in many cases, the term hypertrophy disease of the prostate gland is used to indicate pathological hyperplasia conditions of the prostate gland[5]. In any event, treatment of urinary disorders is still extremely important for the patient. Furthermore, when treating symptoms in which there is no hypertrophy of the prostate gland and no occlusion of the urinary tract, urine flow condition tests and neurological diagnoses must often be made. It is often difficult to provide new treatment after this (Figure 2, *).

Here, considering the relationship between lower urinary tract occlusion and overactive bladder first and foremost for prostate gland hypertrophy, the cause of the overactivity is 1) little urinary

volume per time and a great deal of urine retention so that this becomes frequent urination. 2) Urge urination, frequent urination caused by physical stimulation of the vesical triangle caused by hypertrophied prostate gland. 3) Sphincter is compensated for elimination impairment, hypertrophies and goes into an overactive condition. Changes in the urination nerve control circuit accompanying this are also taken into consideration (Figure 3).

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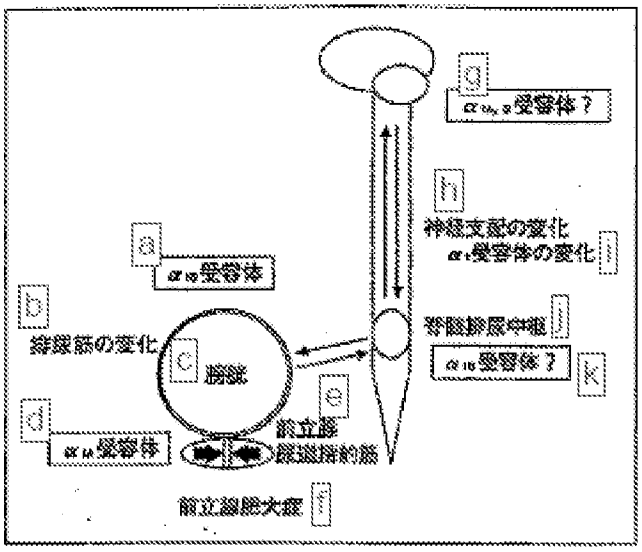

Figure 3 Adrenaline Receptor, Prostate Gland Hypertrophy and Overactive Bladder

Key:

left margin, top to bottom:

a) α_{10} receptor;
b) changes in sphincter;
c) bladder;
d) α_{1A} receptor;
e) prostate bland urethral sphincter muscle;
f) hypertrophy of prostate gland;
g) $\alpha_{1A\ D}$ receptor ?;
h) changes in nerve control;
i) changes in α_1;
j) spinal urination center;
k) α_{10} receptor?;

Here, we will discuss the third cause as well as the relation to the adrenaline α_1 sympathetic nerve blocker (α_1 blocker) as a therapeutic agent for hypertrophy of the prostate gland. α_1 blockers are known to have A, B and D sub-types (classification by mRNA as a, b and d). Among these sub-types, the contribution of α_{1D} receptors is garnering attention in overactive bladder accompanying lower urinary tract occlusion[6]. It has been reported[7] that the reason for this is because α_1 receptor sub-type mRNA has a significantly large amount of α_{1a} (30 to 40%) and α_{1d} (60 to 70%) in the human normal sphincter and the amount of protein in the α_1 receptor sub-type is present in virtually the same proportion. It has also been reported[8] that the affinity to α_{1d} is 10 to 100 times higher than $\alpha_{1a,b}$ even for the affinity to the sub-type of the α_{1a} receptor. However, in *in vitro* experiments carried out using a detrusor fragment, it was reported[9] that the reaction from the α_1 receptor stimulating agent was slow and that the manifestation of α_1 receptor sub-type mRNA was dominant in human sacral vertebra parasympathetic nerve nuclei[10]. Based on these, it is thought that the α_{1D} receptor sub-type is related to pathologies of the overactive bladder in the upper nerve control region from the spinal urination center. However, there are still aspects regarding the contribution of the sub-types in the study of the urine flow condition which are unclear[11,13]. In experiments carried out using rat models on the urine flow condition for overactive bladder condition accompanying lower urinary tract occlusion diseases assuming abnormal

prostate gland disease, there was a clear-cut difference with normal [rats] in the degree related to α_1 receptors in urination[14]. It has also been reported[4] that the α_1 receptors were extremely important in the manifestation of overactive conditions. The same results have also been reported[14] on the nerve control level which is higher than the spinal urination center. However, as yet the sub-type which caused the changes has not been sufficiently clarified and this must be studied in the future.

Summary

We have provided an overview of the relation between overactive bladder which is a new concept having urination urge as its chief symptom and hypertrophy of the prostate gland which is the principal prostate gland illness including the relation to α_1 blockers which is currently the main therapeutic agent for hypertrophy of the prostate gland.

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